SECTION 617 - TRAFFIC CONTROL

617.01 Description.

This work shall consist of the planning for and the carrying out of maintenance and protection of vehicular or pedestrian traffic and to provide for the safe and convenient passage of such traffic, within the scope of the Project. Maintenance and protection of traffic includes furnishing, assembling, placing, and relocating traffic control devices, including pavement markers, and removing them when they are no longer required.

MATERIALS

617.02 Materials.

Materials shall conform to the following Subsections:

Removable Pavement Marking Tape and Removable Black Line Masking Tape 912.12
Temporary Pavement Markers 912.16

EQUIPMENT

617.03 Traffic Control Devices.

Traffic control devices need not be new but must be in good condition as approved. Traffic control devices, other than those shown on the Plans, shall conform to the Manual on Uniform Traffic Control Devices.

Before beginning construction, traffic control devices shall be placed where shown on the Plans or directed by the Engineer. Traffic control devices shall be kept clean and maintained in good condition until no longer required for the Project, at which time they shall be disposed of.

Traffic control devices shall also be placed as directed to provide traffic control for personnel doing inspections, sampling, testing, or taking measurements required for the Project.

Traffic control devices shall conform to the following:

1. **Construction Signs.** Construction sign G20-1 shall be located at the limits of the Project as the first order of Work for construction signs for projects longer than 2 miles.

   The number and location of construction signs W99-2 with the legend **Give Us a Brake - Slow Down!** shall be as directed. A one-quarter full size detail is available upon written request to the appropriate Regional Construction Engineer listed in Subsection 101.04 of the Special Provisions.

   When construction signs conflict with existing signs, the existing signs shall be covered.

   When construction signs are no longer required, they shall be removed. If they are temporarily not required, such as overnight, they shall be either temporarily removed or covered. Signs covered from view of the traveling public shall be completely covered with lightweight opaque material securely fastened so that it does not blow in the wind. Burlap shall not be used.

2. **Construction Barriers.** Precast concrete curb used for construction barriers shall be concrete or white concrete conforming to Subsection 605.09. Construction barrier curb delivered to the job site shall be in new condition and maintained throughout the duration of the Project. The Engineer shall be the sole judge of the acceptability of the precast concrete curb. Precast concrete curb deemed unsatisfactory by the Engineer shall be replaced at no cost to the State.

   Construction barrier curb Type 4, Alternate Design A or B may be used interchangeably in any location where Type 4 has been specified, except that Alternate Design B, Joint Class D, shall be used as bridge parapets. Construction barrier curb Type 4, Alternate B, may be used in any location where Type 1 has been specified. There shall be no intermixing of construction barrier curb Types 1 and 4 in any one continuous run.

   Beam guide rail used for construction barrier shall be constructed according to Section 612 and shall be set at locations, and removed and reset at new locations as directed. Components that do not remain serviceable shall be replaced at no cost to the State. Beam guide rail scheduled for permanent installation shall not be used for construction barriers.

   All construction barriers shall be provided with retroreflective sheeting covered reflectors on the top and sides. The reflectors on the top of the construction barriers shall have a surface area of 6 inches wide by 1 foot high mounted on a plastic or 0.080 inch aluminum support. The top reflectors shall be located at 100-foot intervals on tangent sections, curves of radii greater than 1,910 feet, and at 50-foot intervals on curves of 1,910 feet or less.

   The reflectors on the sides of the construction barriers shall have a surface area of 3 by 3 inches and shall be mounted perpendicular to the upper face, 3 inches from the top. A side reflector shall be attached at the lead end of each barrier segment. The side reflectors shall be flexible or hinge-mounted so as to

return to their original position after being struck. Any side reflectors that fail to return to original perpendicular position shall be replaced.

The retroreflective sheeting shall be Type II or Type III-A as specified in Subsection 916.04 and cover the surface areas indicated for top and side reflectors. The retroreflective sheeting shall be yellow when the construction barrier is to the left of traffic and silver (white) when the construction barrier is to the right of traffic.

Reflectors that are lost or damaged shall be replaced at no cost to the State.

3. **Illuminated Flashing Arrows.** Illuminated flashing arrows shall be non-reflective, black, aluminum, or wooden boards equipped with battery-operated amber lights. The minimum mounting height shall be 7 feet above the traveled way from the bottom of the board. Boards shall be mounted on substantial, approved supports of such construction that they have good stability and do not topple, or they may be mounted on a small, two-wheeled, towing trailer. In no case shall they be mounted on a vehicle other than the specified trailer, unless that vehicle is equipped with a truck-mounted crash cushion of an approved design.

   The 2 by 4 footboards shall be equipped with 4-inch low intensity lights, and the arrow panel message shall be comprehensible by a driver from a distance of ½ mile on a sunny day or a clear night. The lights shall flash in unison at a rate of 40 flashes per minute, and the flash duration shall be 50 percent of each flash cycle. Light intensity shall be not less than 7,000 candelas. The 2 by 4-footboards shall only be used during the hours from dusk to dawn.

   The 4 by 8 footboards shall be equipped with 6-inch high intensity lights, and the arrow panel message shall be comprehensible by a driver from a distance of 1 mile on a sunny day or a clear night. The lights shall flash in unison at a rate of 30 flashes per minute, and the flash duration shall be 50 percent of each flash cycle. Each light shall have a minimum peak intensity of 8,800 candelas and shall be equipped with a photoelectric cell that shall automatically reduce the peak intensity to 1,500 candelas when ambient light level drops to 5 foot-candles. The 4 by 8 footboards may be used 24 hours a day as required.

   The lighting system shall have solid state controls, polarity and surge protection, contained in a lockable control box.

   Solar powered battery recharge arrow boards may be used in place of diesel powered battery recharge arrow boards in all non-moving operations. Their use is especially recommended in residential areas and other situations where the noise of the diesel powered battery recharge system would be objectionable.

   When solar powered battery recharge arrow boards are used, a manufacturer's representative must be present before actual use on the Project to instruct personnel on the proper use and set-up of the solar powered battery recharge arrow boards.

   Solar powered battery recharge arrow boards, which do not meet the above requirements for light intensity shall be reviewed and approved by the Department before use on Projects.

   A list of solar powered battery recharge arrow boards approved for use on Projects will be provided in the Special Provisions.

4. **Variable Message Signs.** Variable message signs shall be capable of displaying messages visible from distances of ½ mile under ideal day and night conditions and legible at distances of 900 feet under all weather conditions. A variable message sign unit shall be mounted on a two-wheeled trailer.

   The trailer-mounted variable message sign units shall be structurally adequate to withstand sustained freeway travel speeds of 55 miles per hour with the sign panels in the travel position. The sign panels and the trailers shall be within legal height and width limits, and meet all State and Federal requirements for towed units, when in the travel position.

   The complete message sign units shall be designed to operate in the ambient temperature range of -31 to 158 ºF. When in operation, the units shall be capable of withstanding wind gusts up to 80 miles per hour all stabilizing devices in place. The units shall not be affected by mobile radio transmissions.

   All controls shall be located in lockable enclosures, which shall also be weather and shock resistant.

   A variable message sign shall consist of the following:

   a. **Sign Panel Assembly.** The sign panel assembly shall be of aluminum or stainless steel construction. The sign panel shall consist of three lines of individually changeable orange characters on a black background that are at a wavelength of 590 nanometers. Each line shall be capable of displaying eight characters equally spaced a minimum of 3 inches apart. Each

character shall be a minimum of 1 foot-5 inch in height and 1 foot in width. Each character shall be made up of a matrix of bulbs or the following:

(1) A cluster of 35 LED lamp pixels which have a minimum of four LEDs and maximum of six LEDs per pixel.
(2) A full LED matrix character board.
(3) A full LED matrix board.

The lamps for a bulb matrix sign shall be rugged, high performance, bayonet, or screw base units. Each lamp shall be a minimum of 20 watts with a life expectancy of at least 8,000 hours. The lamps shall have a minimum light output to meet visibility requirements. All wiring shall be suitable for outdoor use. Each connector point of the wiring harnesses shall be properly marked.

The sign panel shall be covered for increased legibility of the sign messages. A bulb matrix sign shall be covered by a sun screen which has fixed horizontal black louvers tilted at 15 to 20 degrees to the horizontal. An LED sign shall be covered with a clear polycarbonate ultraviolet inhibited material to prevent fading.

b. Controller. The controller shall be a fully self-contained, compact, solid state, modularized unit with at least 199 pre-programmed messages and with additional capability for storing an additional 199 user generated messages. The unit shall be furnished with the dual capability of message generation at the unit by an integral or plug-in type keyboard system, or by remote control by a digital cellular phone. The controller display shall show a miniaturized version of the message being displayed, or to be displayed, on the sign panel. For security purposes, password coding or key entry access shall be provided to lockout the keyboard. No message shall be displayed unless approved.

The antenna for cellular phone reception shall be mounted on top of the sign panel assembly to prevent theft or tampering.

The controller shall be designed so that it can accept a pre-programmed default message or indicator. In the event of power failure, the pre-programmed default message or indicator shall automatically be displayed and remain until such time that repairs can be made, or a minimum of 12 nighttime viewing hours. The default message or indicator can be a single or double flashing or pulsating light (i.e. any warning system that will indicate that the unit is on but not functioning properly).

A diesel and battery powered unit shall be equipped with a photocell to reduce the lamp intensity at night thereby eliminating glare to the motorist.

A designated representative of the Contractor, familiar with the operation and programming of the unit, shall be available on the Project.

c. Power Supply. A variable message sign shall be either diesel or battery powered with both having the capability of operating alternately on 120-volt AC commercial electrical service. The power supply shall conform to the following:

(1) Diesel-Powered. A diesel-powered variable message sign shall consist of an alternator power supply driven by an electrically-started diesel engine. The diesel-powered unit shall include a muffled exhaust system to minimize noise. The exhaust system shall include a United States Department of Forestry approved spark arrester.

The diesel-powered unit shall include a fuel tank of sufficient capacity to provide for a minimum of 72 hours of continuous operation without refueling.

The power supply shall be shock-mounted on a cradle to reduce vibration. The power supply shall be locked in a properly ventilated enclosure.

(2) Battery-Powered. A battery-powered variable message sign shall consist of banks of batteries recharged by a solar panel array. The number and size of the battery banks and solar panel array shall be sufficient to operate the sign panel for a period of 18 days without the array being exposed to sunlight. The solar panel array shall be capable of recharging the battery banks at a rate of four hours of sun for one 24-hour period of sign usage. The battery-powered unit shall incorporate an automatic intensity control feature to keep the LED lamp matrix intensity constant with a reduction in battery voltage.

The battery-powered unit shall be designed to also accept recharging from an internal or external diesel engine driven alternator power supply should there be a lack of proper sunlight.

A diesel generator shall be available on the site to charge the batteries in the event the batteries become sufficiently discharged, thereby making the variable message sign non-functional.

d. Structural Support System. The structural support system shall be designed to allow for the sign panel assembly, controller, and power supply to be assembled into a unit that is easily mountable on a trailer. The structural system shall support the sign panel assembly at the proper height and orientation required for visibility, as indicated in Part VI of the MUTCD.

The structural support system shall provide adequate support to allow for complete sign operation, including raising and lowering the sign panel at sustained wind speeds of 30 miles per hour. The raising and lowering mechanism can be either motor-driven or manually operated. If motor-driven, a manual back-up shall be provided in case of electrical failures.

5. Temporary Crash Cushions.

a. Inertial Barrier System. Temporary inertial barrier modules shall be made of frangible polyethylene material, as recommended by the manufacturer, except that the outer surface of the modules shall be a highway yellow color. The modules shall be designed to meet the safety performance recommendations of the NCHRP Report 350, and shall have FHWA approval.

b. Crushable Energy Absorbing System. Temporary crushable energy absorbing system shall be QuadGuard CZ, as designed and manufactured by Energy Absorption Systems, Inc., Chicago, Illinois. The manufacturer shall certify that the system has been crash tested according to NCHRP Report 350 and has passed the Test Level 3. The nose cover shall be a highway yellow color.

c. Non-redirective Energy Absorbing Terminal (N.E.A.T). Temporary crash cushion N.E.A.T. shall be as designed and manufactured by Energy Absorption Systems, Inc., Chicago, Illinois. The manufacturer shall certify that the system has been crash tested according to NCHRP 350 and has passed the Test Level 2. The nose cover shall be a highway yellow color with Chevron stripes.

This device shall be used on roadways where the posted speed limit is less than 40 miles per hour.

6. Traffic Control Trucks with Mounted Crash Cushions. The trucks shall weigh a minimum of 10 tons gross when in use for traffic control. The trucks shall be adaptable to mounting crash cushions at the rear and illuminated flashing arrows on the bed or on the rear of the trucks.

The crash cushions shall be lightweight systems designed by the manufacturer for installation at the back of the trucks. The crash cushions shall meet the safety performance recommendations of the NCHRP Report 350. The crash cushions shall consist of crushable yellow energy absorbing modules, hydraulic tilting systems, and backup structures designed for attaching the system to the trucks. The rear facing of the modules shall have 4-inch wide black strips on high retroreflective yellow sheeting in an inverted "V" pattern. The retroreflective sheeting shall be Type II or Type III-A as specified in Subsection 916.04. The crash cushions shall have standard trailer lighting systems including brake lights, taillights, and turn signals. All exposed steel shall be primed and painted yellow.

The illuminated flashing arrows shall be 4 by 8 foot boards conforming to Subheading 3 above.

The mounting of the crash cushions at the rear and the illuminated flashing arrows on the bed or on the rear of the trucks shall be according to the manufacturer's recommendations. The illuminated flashing arrows shall be fully visible, at all times, to vehicles approaching or following either a stationary or moving operation.

Crash cushions that are damaged or become inoperable shall be repaired or replaced. An adequate number of replacement parts to repair damaged units shall be available on the Project without additional compensation.

CONSTRUCTION

617.04 General.

When the construction involves improvement of an existing roadway, the roadway shall be kept open to traffic unless otherwise approved or shown on the Plans.

The portion of the Project that is opened to traffic shall be kept in such condition that traffic is adequately accommodated. Temporary approaches or crossings and intersections, and access to trails, roadways, businesses, parking lots, residences, garages, and farms shall be provided and maintained in a safe condition. The owners of adjoining properties shall be given a written notice at least three days before the beginning of any Work that interferes with the owners' normal passage.

Equipment or machinery having crawler tracks or other treads that may mar or damage pavements shall not move over or operate from newly constructed or existing pavements unless precautions are taken to prevent such damage.

Any damage to newly constructed or existing pavements within the limits of the Project or adjacent thereto, which in the opinion of the Engineer was caused by the Contractor's operations, shall be repaired as directed, at the Contractor's expense, or the repairs will be made by the Department and the cost of such repairs will be deducted from any monies due or that may become due the Contractor.

Any restrictions of required traffic lane widths or diversion of traffic at any time are subject to approval.

Except as necessary during actual working hours, and then only with approval, equipment, materials, personnel, or employee vehicles shall not occupy any traveled way, shoulder, median, or sidewalk area within or adjacent to the Project that is open to traffic.

If approved, State property adjacent to the traveled way and shoulders may be used for storage of equipment and materials provided the equipment and materials are placed behind barriers or crash cushions, or are stored more than 30 feet from the traveled way. The barriers and crash cushions must be approved before installation. Furnishing, placing, and removing the barriers and crash cushions shall be at no cost to the State.

Work that closes or alters the use of existing roadways shall not be undertaken until adequate temporary or permanent provisions for traffic have been approved.

Where it is necessary for pedestrians to cross or walk within the limits of the Project, temporary sidewalks shall be provided, maintained, and removed as directed.

Construction above vehicular or pedestrian traffic shall not be performed unless there is explicit provision made in the Special Provisions or specific written permission given. Subject to such provision or permission, necessary devices and means to protect such traffic from falling construction materials or other objects, and from painting operations shall be provided at no cost to the State during the time that construction is performed above traffic. The precautions to be taken for the protection of traffic are subject to approval.

Before beginning a seasonal shutdown or any other prolonged Work stoppage, or when Work is suspended according to Subsection 108.14 or 108.15, all excavated areas within the traveled way or adjacent thereto shall be brought to a grade compatible with the existing traveled way or to finished grade, as approved.

617.05 Nighttime Operations.

All operations that are performed during the non-daylight hours shall be properly illuminated to allow for the complete performance and inspection of the work. This work shall consist of furnishing, installing, operating, maintaining, moving, and removing portable light towers and equipment-mounted lighting fixtures for nighttime construction operations, for the duration of nighttime work on the Contract. Nighttime operations consist of work specifically scheduled to occur after sunset and before sunrise. Should the Contractor elect on its own to operate during these hours, the requirements of this Subsection shall apply and no additional compensation will be made. Before nighttime operations may begin the Contractor shall demonstrate to the Engineer that its nighttime operation meets the light level requirements.

1. **Light Levels and Illumination Requirements**. A minimum of 5 foot-candles shall be maintained throughout the entire area of operation. Area of operation is a work area that is a minimum of 50 feet ahead and behind the employee, where an employee is on or near the roadway.

   A minimum illuminance level of 5 foot-candles shall be provided during the setup and removal of lane or roadway closures installed in conjunction with nighttime construction operations.

Specific tasks should meet the minimum illumination levels shown in the following table:

Minimum Illumination Level	Description of Tasks	Areas of Illumination
5 foot-candles	Embankment, fill, and compaction Excavation - regular, lateral ditch, and channel Landscape, grassing, and sodding Maintenance of earthwork embankment Mechanical sweeping and cleaning Reworking shoulders Subgrade stabilization and construction	General illumination throughout area of operation
5 foot-candles	HMA milling * HMA paving operation *	General illumination throughout area of operation Minimum of 200 feet ahead and 200 feet behind equipment
5 foot-candles	HMA roller operation *	General illumination throughout area of operation Minimum of 100 feet ahead and 100 feet behind equipment
10 foot-candles	Barrier walls and traffic separators Base course construction HMA milling * HMA paving operation * HMA roller operation * Bridge decks Bridge painting Concrete pavement Drainage structures, culverts, and storm sewers Guide rail and fencing Highway signs and permanent installation Removal of pavement Other concrete structures Painting stripes and pavement markers Pot hole filling Repair of concrete pavement Resetting guide rail and fencing Sidewalks Surface treatment Waterproofing and sealing Any other operation not listed in this table	General illumination of tasks and around equipment Minimum of 25 feet ahead and 25 feet behind equipment Illumination shall be provided on the sides of the equipment.
20 foot-candles	Crack filling, sawcutting, and sealing joints Electrical work Highway street lighting Traffic signals Intelligent transportation systems	Illumination on task

* Both requirements of 5 foot-candles and 10 foot-candles for these operations must be met.

Light meter readings shall be taken horizontally to the roadway surface facing the light source.

If the Contractor fails to meet minimum illuminance levels at any time, the Contractor shall cease its nighttime operations until such time that required light levels are attained.

The uniformity of illuminance, defined as the ratio of the average illuminance to the minimum illuminance over the work areas, shall not exceed 5:1.

Construction operations shall be deemed to include all work operations by the Contractor's personnel, including layout and measurements ahead of the actual work.

2. **Equipment**. Materials and/or equipment shall be in good operating condition and in compliance with applicable OSHA, NEC, and NEMA codes.

The Contractor shall furnish, for use by the Engineer, two light meters capable of measuring the level of illuminance in lux. These light meters shall be supplied to the Engineer for use as necessary to check the adequacy of illumination throughout the nighttime operations. The light meters will become the property of the Contractor after Acceptance.

The Contractor shall provide suitable brackets and hardware to mount lighting fixtures and generators on machines and equipment. Mountings shall be designed so that lights can be aimed and positioned as necessary to reduce glare and to provide the required illuminance. Mounting brackets and fixtures shall not interfere with the equipment operator or any overhead structures and shall provide for secure connection of the fixtures with minimum vibration.

Portable and trailer-mounted light towers shall be sturdy and free-standing without the aid of guy wires or bracings. Towers shall be capable of being moved as necessary to keep pace with the construction operation. Portable towers and trailers shall be positioned to minimize the risk of being impacted by traffic on the roadway or by construction traffic or equipment.

Light towers mounted on paving and milling machines, rollers, and other paving equipment shall not exceed the height of vertical underclearances, such as trees, aerial utilities, or bridge underclearances. Lights shall be aimed and adjusted to provide uniform illumination with a uniformity ratio of 5:1. The hopper, auger, and screed areas of pavers shall be uniformly illuminated. The operator's controls on all machines shall be uniformly illuminated.

Conventional vehicle headlights shall not be permitted as the means of illumination while working. All moving equipment used for nighttime operations shall have a lighting system consisting of a minimum of two lights directed in each direction of travel of the equipment. Off-road equipment shall have high intensity retroreflective sheeting along the length of all four sides. On-road equipment shall have this sheeting at a minimum, along the length, excluding the cab, and across the back of the body of the vehicle. Trailers and trailer-mounted devices shall be equipped with sheeting on both sides and across the back. Sheeting shall be 2 inches wide with alternating red and white strips and meet current National Highway Transportation Safety Administration requirements for red and white conspicuity tape. All workers shall, during the hours of darkness, wear reflectorized garments as specified for traffic directors.

Existing street and highway lighting shall not eliminate the need for the Contractor to provide lighting. Consideration may be given to the amount of illumination provided by existing lights in determining the wattage and/or quantity of lights to be provided.

The Contractor shall provide sufficient fuel, spare lamps, generators, and qualified personnel to ensure that all required lights operate continuously during nighttime operations. Each generator shall have a fuel tank of sufficient capacity to permit operation of the lighting system for a minimum of 12 hours. In the event of any failure of the lighting system, the operation shall be discontinued until the required level of illumination is restored. Hydraulic generator systems shall be used in residential areas and areas designated to minimize noise pollution. If hydraulic generator systems are unavailable, other generator-powered systems may be used with the approval of the Engineer.

A supply of emergency flares shall be maintained by the Contractor for use in the event of emergency or unanticipated situations.

3. **Glare Control.** All lighting provided under this item shall be designed, installed, and operated to avoid glare that interferes with traffic on the roadway or that causes annoyance or discomfort for residences adjoining the roadway. The Contractor shall locate, aim, and adjust the lights to provide the required level of illuminance and uniformity in the work area without the creation of objectionable glare. The Engineer shall be the sole judge of when glare is unacceptable, either for traffic or for adjoining residences. The Contractor shall provide screening such as shields, visors, or louvers on lights as necessary to reduce objectionable levels of glare.

617.06 Detours.

Approval of the Engineer and consent of the local authorities having jurisdiction shall first be obtained for rerouting traffic over detours that are not shown on the Plans. All necessary arrangements shall be made with such authorities regarding the establishment, maintenance, and repair of such detours, the regulation and direction of traffic thereon, and signing. Adequate directional and detour signs, acceptable to the local authorities, shall be furnished and erected at the locations where such authorities may direct. All Work in connection with such detours shall be at no cost to the State.

Any detours used exclusively for hauling materials and equipment shall be constructed and maintained at no cost to the State.

617.07 Stage Construction.

The Engineer shall be notified one month in advance of a tentative date for establishing new traffic patterns. This date shall be finalized 14 calendar days before the establishment of the new traffic patterns resulting from stage construction, and 21 calendar days before the establishment of a detour for the closing of any roadways.

Existing roadways that are proposed to be dead-ended or abandoned shall not be closed to traffic until adequate temporary or permanent provisions for traffic have been approved.

617.08 Traffic Control Coordinator.

Before the start of construction operations, the Contractor shall assign a supervisory-level employee to be the traffic control coordinator. The Resident Engineer shall be notified as to the name and method of contacting the traffic control coordinator on a 24-hour basis.

The traffic control coordinator shall be a full-time position. The traffic control coordinator shall have successfully completed the Rutgers R2T2 Traffic Control Coordinator Program, or an equivalent course of training as approved by the Office of Capital Project Safety, and shall be delegated authority by the Contractor to implement and maintain all traffic control operations on behalf of the Contractor. The traffic control coordinator shall be approved by the Engineer based on a written request of the Contractor. The request shall set forth in detail the training and experience of the traffic control coordinator. The traffic control coordinator shall be assisted by additional members of the Contractor's work force as needed and as mutually agreed upon by the Engineer and the traffic control coordinator. The traffic control coordinator shall be equipped with a vehicle capable of traversing the entire project and a mobile communications system. When requested by the Engineer, the traffic control coordinator shall demonstrate competency to the Engineer; failure to demonstrate competency shall result in the immediate replacement with a competent person.

The traffic control coordinator shall perform daily inspections, including weekends and holidays, with some inspections at night, and take all corrective action to ensure compliance with the traffic control plan and other approved standards. The Engineer shall be advised of the schedule of these inspections and be given the opportunity to join in the inspection. In addition, the duties of the traffic control coordinator shall include, but shall not be limited to, the responsibility for ensuring the following:

1. Set-up and removal of all traffic control devices according to the Contract Documents.
2. Correction of deficiencies of traffic control devices within two hours of discovery or notification by the Engineer.
3. Repositioning traffic control devices displaced by traffic or construction equipment.
4. Covering or uncovering signs as appropriate.
5. Repairing or replacing damaged traffic control devices.
6. Replacing batteries, light bulbs, control panels, and other electrical components.
7. Keeping all traffic control devices clean.
8. Adding fuel and oil to power units for traffic control devices.
9. That all Contractor equipment and vehicles are properly stored and packed so as not to create a traffic hazard.
10. Properly storing traffic control devices when not in use.
11. That all excavations or drop-offs greater than 2 inches deep are eliminated, covered, or otherwise protected during non-working periods.

617.09 Traffic Control Plan (TCP).

The TCP provides for the treatment of conditions caused by or encountered during the Work on the Project. The Work shall be performed according to the TCP.

The TCP shall be a stand-alone document and shall not be reliant on any ancillary conditions or circumstances relative to the Project site. It is the Contractor's sole responsibility to implement the TCP. The TCP shall not be the original plan detail or a subsequent modification as proposed by the Contractor unless specifically adopted by the Contractor, in writing, and the Contractor provides detailed information as to how the original or modified original plan will support its operation with the Engineer's approval.

Thirty days before the start of Work, the Contractor shall submit a written TCP operations to the Engineer for acceptance. The Engineer will review and approve the TCP with reasonable promptness for conformance with the Contract Documents. The Engineer's approval of the TCP does not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, unless the Contractor has informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written approval to the specific deviation, nor does the Engineer's approval relieve the Contractor from responsibility for errors or omissions in the TCP. The TCP shall detail the means of traffic control for all aspects of the Contractor operations. The TCP shall be signed and bear the embossed seal of a Professional Engineer licensed to practice in the State. The TCP shall identify any contingencies or foreseen problems and address remedial actions. Subsequent changes to the TCP during the progress of the Work to accommodate actual or unforeseen project conditions shall be submitted and approved as specified above.

617.10 Traffic Directors.

A. Trained Flaggers. Trained flaggers shall be in good physical condition, including sight and hearing, mentally alert, and shall have a courteous but firm manner, neat appearance, and a sense of responsibility for the safety of the public. Trained flaggers shall wear an orange or fluorescent orange garment such as a shirt, jacket, or vest. This garment shall be reflectorized for nighttime operations with reflective material that shall be orange in color. When controlling traffic, trained flaggers shall be equipped with STOP/SLOW paddles, and shall follow the procedures stipulated for flaggers in the MUTCD.

Traffic directors as specified in this Subsection shall be an approved subcontractor or employees of the Contractor so indicated and on the Contractor's payroll. They shall not be police from any jurisdiction working on behalf of the Contractor while in uniform or in any other official status. All trained flaggers used as traffic directors shall be formally trained in flagging operations and proper use of the **STOP/SLOW** paddle. This training may consist of ATSSA, union, or trade association training, or training by an individual who has received formal training from a recognized program or agency in work zone traffic control. When requested by the Engineer, traffic directors and/or flaggers shall demonstrate competency to the traffic control coordinator; failure to demonstrate competency to the traffic control coordinator shall result in the immediate replacement with a competent person.

B. Traffic Safety Services. Traffic safety services shall consist of the assignment and use of police in conjunction with the Resident Engineer in the enforcement of the approved TCP, and applicable laws to provide a safe worksite for both construction personnel, and the traveling public.

Police providing traffic safety services shall be on-duty New Jersey State Police (NJSP) unless otherwise designated, at the Preconstruction Conference, to be on-duty police officers from the municipality or county within which the Work of the Project is to be accomplished. The term "municipal police" when used shall mean all police other than NJSP.

Police will be assigned during construction hours at locations and times designated by the Engineer. The Contractor agrees that it shall make no claims against the State for extra costs resulting from any delays or interruptions to its operations attributable to the actions or inactions of police in the performance of traffic safety services. The Contractor further agrees that it has incorporated in its Proposal any costs that may be incurred by the Contractor as a result of the actions or inactions of police in the performance of traffic safety services, and agrees to bear the risk of loss for any costs not included in its Proposal.

Police providing traffic safety services shall operate traffic signals when manual control of the signals is required, or shall maintain traffic flow at a signalized intersection when the signals are temporarily out of service.

The use of police on the Project will be as determined and directed by the Engineer. The Engineer's projections for anticipated usage of police shall consider the Contractor's operations provided that the Contractor notify the Engineer of planned operations at least 72 hours before projected usage. The Project progress schedule shall not constitute notice for usage of police traffic directors. Assignment of police to the Project will be on the basis of the Contractor's operations, and the needs of the worksite, and will be made solely by the Engineer with the advice of the NJSP.

The Contractor's failure to give complete, detailed, timely and proper notice of its operations shall not be cause for claims for extra costs by the Contractor, nor shall the number of police assigned to a project constitute a valid basis for a claim by the Contractor. The Contractor agrees that the TCP is a stand-alone document, and that the Contractor is solely responsible for the safety of the Project, the continuity of movement of traffic through the worksite, and the impact of traffic on its work.

The Contractor is advised that there may be emergency situations when police are not available, or when police do not arrive at the job site until after the scheduled arrival time or leave before the scheduled departure time. The Contractor agrees that it shall make no claims against the State for any costs associated with the failure of police to be on the job site at a scheduled time. The Contractor further agrees that it shall assume all risk of the possibility of such occurrences and shall factor the associated costs into its Proposal.

The Contractor shall be fully responsible for the set-up and maintenance of the TCP except as required by State law or as specifically set forth in the Contract. The use of police in the providing of traffic safety services is supplemental to the TCP and their presence shall not relieve the Contractor of its responsibility to maintain the TCP and safety on the Project.

The Contractor shall notify the Resident Engineer of any work cancellations at least 24 hours before the start of work with the sole exception of unforeseen weather cancellations that occur after the start of work or less than 24 hours before the start of work.

When police have been assigned to a project by the Resident Engineer, it is the Contractor's obligation to notify the Engineer of all cancellations of projected or scheduled operations. Police reporting for work will be reimbursed for a minimum of four hours. If projected work has been canceled, for whatever reason, including but not limited to foreseen weather conditions, and the Resident Engineer was not notified of the cancellations at least 24 hours before by the Contractor, except as noted above, the police will each be reimbursed for four hours of work. These payments will be made by the State through interagency transfer and the amount will be deducted from Contractor invoices.

617.11 Variable Message Signs.

Variable message signs shall be located such that they provide motorists with clear, unobstructed visibility of the signs from distances of ½ mile and legibility of the sign messages at a minimum of 900 feet from all lanes of traffic. The variable message signs shall be physically located off of the traveled way or behind approved closure devices as directed. All messages shall be cycled so that two message cycles are displayed to a viewer beginning at a point 900 feet distant from the source with a total minimum viewing angle of 25 degrees and completing both message cycles when the same viewer is 250 feet distant from the source.

Battery-powered variable message signs shall be used in residential areas, and areas designated, to minimize noise pollution. If battery-powered variable message signs are unavailable, diesel-powered may be used with approval.

All control panel enclosures shall be kept locked when left unattended to prevent tampering with the displayed messages or general operation of the signs.

Malfunctioning variable message signs shall be repaired or replaced within 12 hours.

617.12 Temporary Crash Cushions.

A. Inertial Barrier System. Temporary inertial barrier system modules shall be placed on relatively flat surfaces. The systems shall conform to the specified weights and module configurations. Each module shall be placed by outlining its location on the roadway surface with removable tape or other non-permanent marking, thereby marking the periphery of the modular base, and identifying its weight within the circumference. The module manufacturer's trained technician shall be on the Project at all times during the installation of the system.

Temporary inertial barrier modules may be placed on wooden or steel platforms to facilitate relocation. No part of a wooden platform shall be more than 4 inches in height or extend more than 8 inches beyond the modules. No part of a metal platform shall be more than 2 inches in height or extend more than 8 inches beyond the modules.

Loose sand, conforming to Subsection 901.10, Subpart C, shall be placed within each module to a depth recommended by the manufacturer. The sand shall have a dry density of 90 to 100 pounds per cubic foot and a three percent maximum allowable moisture content. Five to seven percent of sodium chloride (NaCl) by weight shall be added and evenly dispersed throughout the sand to prevent freezing. Calcium chloride ($CaCl_2$) shall not be submitted for sodium chloride.

A plastic lid shall be placed on the module in such a manner as to ensure that no weather elements come in contact with the sand. Four equidistant rivets or other fasteners, recommended by the manufacturer and approved by the Department, shall be installed on the periphery of the lid to prevent high velocity escape upon impact.

When different manufacturers supply temporary inertial barrier system units for a Project, different modules shall not be intermixed within any inertial barrier system.

Modules which are lost, stolen, destroyed, or are determined to be unacceptable shall be replaced without additional compensation.

Temporary inertial barrier system units shall be kept clean and maintained in good condition. Damaged units shall be restored immediately according to Subsection 617.08. An adequate number of replacement parts to repair damaged module units shall be available on the Project without additional compensation. All debris resulting from damage to a system shall be removed and disposed of.

When no longer required for the Project, the inertial barrier system units shall be removed and disposed of.

B. Crushable Energy Absorbing System. Temporary QuadGuard shall be installed on relatively flat concrete or HMA foundation with steel backup structures according to the manufacturer's recommendations. The manufacturer's trained representative shall be present at all times during the installation.

Temporary QuadGuard components that are lost, destroyed, or are determined to be unacceptable shall be replaced without additional cost to the Department.

Temporary QuadGuard units that are damaged shall be restored immediately according to Subsection 617.08. An adequate number of replacement parts to repair the damaged units shall be available on the Project site at no additional cost to the Department.

When no longer required for the Project, the temporary QuadGuard components shall be removed and disposed of.

C. Non-redirective Energy Absorbing Terminal. Temporary crash cushion N.E.A.T. units shall be installed on relatively flat surface according to the manufacturer's recommendations. The manufacturer's trained representative shall be present at all times during the installation.

Temporary N.E.A.T. components that are lost, destroyed, or are determined to be unacceptable, shall be replaced without additional cost to the Department.

Temporary N.E.A.T. units that are damaged shall be restored immediately according to Subsection 617.08. An adequate number of replacement parts to repair the damaged units shall be available on the Project site at no additional cost to the Department.

When no longer required for the Project, the temporary N.E.A.T. units shall be removed.

617.13 Removable Black Line Masking Tape.

The black line masking tape shall temporarily obscure the existing permanent traffic stripe on HMA surfaces. The existing traffic stripe shall be completely covered or masked by the application of the black line tape.

The black line masking tape shall be applied over dry existing traffic stripes according to the manufacturer's recommendations and when the weather is favorable as determined by the Engineer. Any portion of the black line masking tape that is loosened after placement over the existing traffic stripe, shall be replaced by the Contractor within two hours or as directed by the Engineer at no cost to the State.

Proper care shall be taken in completely unmasking the existing underlying traffic stripe without the use of heat, solvents, grinding, sanding, or water, when the black line masking tape is no longer required.

Existing permanent traffic stripes that become damaged during removal of the black line masking, including discoloration caused by the black masking tape, shall be replaced by the Contractor at no cost to the State.

617.14 Temporary Pavement Markers.

Markers shall be applied using butyl adhesive pads to clean, dry pavement surfaces which are free of cracking, checking, spalling, or failure of underlying base material. If during installation, a marker will be placed on one of these defects or a joint, the affected marker shall be relocated longitudinally a minimum of 2 inches. Any marker that comes up from the pavement before the permanent traffic stripes shall be replaced by the Contractor at no cost to the State.

Temporary markers that have been placed in the same location as where the permanent stripes will be placed shall be removed before striping. These markers shall not be removed until the striping equipment is on site and the striping operation is ready to commence. Should there be a breakdown of the striping equipment and the traveled

way is to be reopened, the removed markers shall be reapplied at no cost to the State before reopening the traveled way.

All temporary markers shall be removed when no longer required. Any pavement area that has been determined to be damaged as a result of the removal operation shall be repaired at no cost to the State by the method specified by the Engineer.

617.15 Removable Pavement Marking Tape.

Removable pavement marking tape shall be applied at designated locations. The tape shall be white or yellow and shall be applied in single or double lines, as designated.

The surface upon which the tape is to be applied shall be prepared according to Subsection 618.05. Marking tape shall be applied on dry surfaces, when the surface temperature is between 50 and 150 ºF and when the ambient temperature is 50 ºF and rising, and when the weather is otherwise favorable as determined by the Engineer. The tape shall not be overlapped, and only butt splices shall be used.

To ensure maximum adhesion, the tape shall be tamped and a truck shall be driven slowly over the tape several times. The tape shall be removed when no longer required for traffic control.

Tape that has become damaged and is no longer serviceable shall be replaced and will not be measured for payment. Tape that is damaged by construction operations shall be replaced without additional compensation.

COMPENSATION

617.16 Method of Measurement.

The quantity of traffic control devices measured by the linear foot, unit, or unit basis is the maximum quantity required to be in service at one time according to traffic control requirements.

Breakaway barricades will be measured by the number of units.

Construction barriers of the various kinds and types will be measured by the linear foot.

Construction signs will be measured by square foot.

Construction identification signs of the various sizes will be measured by the unit.

Delineator guide posts, drums, traffic cones, and vertical panels will be measured by the number of units.

Temporary sidewalk will be measured by the square yard.

Traffic directors, flaggers will be measured by the hour.

Police providing traffic safety services are not employees of, nor are they to be paid by, the Contractor. Hours of police assigned to the Project will not be measured for payment except as noted above where reimbursement of the State is required. Police, if NJSP, are employees of the State. Police, if municipal police, are employees of the municipality in which the Project exists and serve as a vendor service to the State.

Variable message signs will be measured by the unit.

Temporary crash cushions, inertial barrier system will be measured by the number of units. A unit shall consist of a total inertial barrier system composed of the required number of modules.

Temporary crash cushions, crushable energy absorbing system, QuadGuard will be measured by the number of units. A unit shall consist of a total energy absorbing system composed of the required number of bays.

Temporary crash cushion, N.E.A.T. will be measured by the number of units. A unit shall consist of a total energy absorbing system and all components required to attach the system to construction barrier.

Traffic control trucks with mounted crash cushions will be measured by the number of units. A unit shall consist of the truck, crash cushion, and arrow board.

Temporary pavement markers will be measured by the number of units.

Removable pavement marking tape will be measured by the linear foot of 4-inch wide strips, deducting the gaps. Gaps will not be counted.

Removable black line masking tape will be measured by the linear foot for each 4-inch width of existing stripe that is to be covered. Gaps will not be counted.

617.17 Basis of Payment.

Payment will be made under:

Pay Item	*Pay Unit*
BEAM GUIDE RAIL, CONSTRUCTION BARRIER	LINEAR FOOT
BREAKAWAY BARRICADES	UNIT
CONSTRUCTION SIGNS	SQUARE FOOT
CONSTRUCTION IDENTIFICATION SIGNS, ___ ' X ___ '	UNIT
DELINEATOR GUIDE POSTS	UNIT
DRUMS	UNIT

ILLUMINATED FLASHING ARROWS, ___ ' X ___ '	UNIT
PRECAST CONCRETE CURB, CONSTRUCTION BARRIER, TYPE ___	LINEAR FOOT
TEMPORARY SIDEWALK	SQUARE YARD
TRAFFIC CONES	UNIT
TRAFFIC DIRECTORS, FLAGGERS	HOUR
VARIABLE MESSAGE SIGNS	UNIT
VERTICAL PANELS	UNIT
TEMPORARY CRASH CUSHIONS, INERTIAL BARRIER SYSTEM, ___ MODULES	UNIT
TEMPORARY CRASH CUSHIONS, QUADGUARD, ___ BAYS, ___ "WIDE	UNIT
TEMPORARY CRASH CUSHIONS, N.E.A.T.	UNIT
TRAFFIC CONTROL TRUCKS WITH MOUNTED CRASH CUSHIONS	UNIT
TEMPORARY PAVEMENT MARKERS	UNIT
REMOVABLE PAVEMENT MARKING TAPE	LINEAR FOOT
REMOVABLE BLACK LINE MASKING TAPE	LINEAR FOOT

No payment will be made to the Contractor for traffic safety services.

Payment for traffic control devices that are on a unit or linear foot basis will be made at 50 percent of the Contract bid price upon delivery, placement, and approval with the balance prorated over the duration of the Contract.

Separate payment will not be made for relocating traffic control devices and the lighting systems used for nighttime operations as required or as directed, except for relocations of precast concrete curb construction barrier required by change of plan or because of a change in the staging of the project as directed by the Engineer. Payment for these approved relocations of precast concrete curb construction barrier will be made by Supplementary Agreement; however, if a Supplementary Agreement cannot be reached, payment will be made on a force account basis according to Subsection 109.03. No separate payment for reallocations or precast concrete curb construction barrier will be made for additional relocations due to changes in staging of the Project or for relocations made for the Contractor's convenience.

Separate payment will not be made for posts for construction signs.

Separate payment will not be made for lighting for nighttime operations, but all costs thereof shall be included in the prices bid for the various Pay Items scheduled in the Proposal.

Separate payment will not be made for traffic control coordinator but all costs thereof shall be included in the various Pay Items scheduled in the Proposal.

Separate payment will not be made for relocating temporary crash cushions as required or as directed.

Separate payment will not be made for moving the traffic control truck units during the various stages of construction.

Separate payment will not be made for escape ramps provided at the edges of pavement lifts or at excavations. All costs thereof shall be included in the prices bid for the various Pay Items scheduled in the Proposal.